University of Applied Sciences

HOCHSCHULE
EMDEN·LEER

Machine Learning

Scientific Project - Best Practice

Prof. Dr. E. Wings

Agenda

1. General
2. Start
3. Literature research
4. Creation of an outline
5. Preparation of the project plan
6. Preparation of documentation
7. Formalities & General Hints

General

General

The main purposes of publications (reports and presentations) are to disseminate information and to demonstrate the author's personal skills. The role of structure and format is often **underestimated**.

General

Presentations, lectures, reports and documentations are frequently used methods to make information, ideas, results that some people have available to others.

The **success** of information transfer depends not only on the **content** itself, but also to a not inconsiderable extent on the **form** of transfer.

General

However, it should not be forgotten that **the** structure or the way of lecturing does not exist; what is perceived as good or right differs from subject area to subject area, from university to university, even from person to person. The following lines are therefore only intended as food for thought in the structure of such documents or lectures and generally apply equally to both.

General – Goals

Reports and presentations usually aim to achieve three main objectives:

1. Presentation/explanation of a specific issue/topic/problem
2. Engaging/interesting/fascinating listeners/readers
3. "Selling" one's own person/performance

If even one of these aspects is ignored, the impact of the work is rapidly reduced!

Start

Start

- First create a directory for the project.
- Create a folder for project management.
- Copy the LaTeX template to.
- Name the files for the template correctly:
  - Example „Eckenverrundung“
  - bad „report“
    - In general, do not use spaces or special characters in directory and file names.
    - Use short descriptive terms.
- Create the following files:
  - **author.xlsx**: Project name, authors, matriculation numbers, date, subject, CPs
  - **README.md**: Project name, list of all directories and files, explanation of contents

author.xlsx und README.md

author.xlsx

Name of the project/lecture:
<Mathematik I>
Project's Name:
<Installation and Use of CUDA with Tensorflow>
Supervisor: Prof. Dr. Elmar Wings
CPs: <5>

Author:
Name, first name, matriculation number
<Janssen, Wiebke, 1234567>
Study programme:
<Maschinenbau und Design im Praxisverbund>
Semester: 4

Name, first name, matriculation number
<Janßen, Peter, 7654321>
Study programme:
<IBS>
Semester: 4

Name, first name, matriculation number
...

README.md

Name of the project/lecture:
<Mathematik I>
Project's Name:
<Installation and Use of CUDA with Tensorflow>
Supervisor: Prof. Dr. Elmar Wings
<Brief description>
1. Name, first name, matriculation number
2. Name, first name, matriculation number
...
(Documents for the term paper)
Folder structure CUDAWithTensorFlow:
Report (elaboration in LaTeX)
Literature (Literature/documents used as pdf files)
README.md
author.xlsx
Folder structure report:
CUDAWithTensorflow.tex
CUDAWithTensorflow.pdf
General
Bib
Images
Chapters
...

Github.com

- Create accounts at GitHub.com
- Create a project at GitHub.com
- Copy the project directory into the GitHub project
- Test access
- Check whether a README.md file exists.

Installing the software

- Installing LaTeX: TeXLive
- Installation takes time! Before you carry out further installations, the installation must be completed.
- Wait!
- Installing TeXstudio
- Installing Sumatra PDF
- In a programming task:
  Installing doxygen

Software test

- Test LaTeX by using the template. However, the template must **not** be changed.
- Configure TeXstudio
  - Options → Configuration . . . → create → Standard bibliography program: biber.exe
  - Options → Configuration . . . → commands → External pdf viewer: sumatrapdf.exe

First Steps with LaTeX

- read the template (pdf/tex)
- Keep commands, replace contents, e.g.
  - Headlines
  - Tables
  - Graphics
  - Enumerations
  - ...

Literature research

Literature research

A list of sources/Literature is necessary in any case; it has several aims. On the one hand, it should show that the author has made extensive enquiries in many competent places. On the other hand, it shows that he has naturally drawn on existing knowledge (and not invented the wheel for the third time . . .), but that he also names others as authors out of respect for their achievements (this also applies to pictures taken from others!). Finally, the directory is the starting point for those interested to delve deeper into the matter.

Literature research

- Article from a specific journal
- conference article
- Technical book
- phd-Thesis
- Website
  - Data sheets
  - Only source
  - Wikipedia
  - slideshare, lectures

Literature research

- Search for literature e.g. at
  - https://link.springer.com
  - https://ieeexplore.ieee.org
  - https://www.scopus.com/
  - https://www.sciencedirect.com/
  - https://scholar.google.de
  - https://www.researchgate.net
  - https://www.zenodo.org
  - https://depatisnet.dpma.de/DepatisNet/depatisnet?action=einsteiger
  - Library of the university: Media offers or shibboleth

It is recommended to use Citavi or jabref.

Literature research

Results:

- List of keywords
- Brief description of the sources:
  - Why was this source chosen?
  - What is covered?
  - What is good/bad?
- bib file
- Bibliography

Literature research

When do you have enough literature sources:

- Have you covered all the keywords?
- Have you reached the minimum number?
- Have you reached the maximum number?

bib Entries

- use the correct bib type, e.g. article, book, proeceedings, inproceedings, online
- minimal information
  - author/editor
  - title
  - year
  - publisher
- if you find a bib entry, please check it.

Creation of an outline

Creation of an outline

Based on the keywords and the research, an outline can now be created.

Writing the introduction

The following facts are presented in the introduction:

- Embedding of the project/state of the art with sources
- Description of the task
- Description of the particular challenges with sources
- Description of how the challenges were solved.
- Brief description of the procedure and contents of the individual chapters.

Attention: This will not be a 100% solution. The introduction must be revised several times.

Writing the introduction - Example

„This paper is an examination performance of the module XY of the Department of Mechanical Engineering at Emden/Leer University of Applied Sciences. On the basis of this paper, a group assessment is awarded and the module is deemed to have been passed. The grade is included in the overall grade point average.“

„The aim of this paper is to show the reader how . . . works and how it can be applied to the problem XY. If this is achieved, a good grade should come out.“

Writing the introduction - Example

„Flettner rotors are now widely used [1,2,3]. . . .“

„The construction of a Flettner rotor for a water taxi [4] . . . “

„External influences pose great challenges to [5,6] . . . “

„Through the use of 3D printed parts, . . . “

„In the second chapter, . . . “

Preparation of the project plan

Preparation of the project plan

Now the project plan must be created:

- Which subtasks exist?
- What results do we get at the end of a subtask?
- Which internal dependencies must be taken into account?
- Who is responsible for the subtask?
- Which external dependencies, e.g. orders, delivery times, holidays, must be taken into account?
- How much time does a subtask ideally take?
- How is the required time distributed on the timeline?

Attention: The result is a schedule that must be updated weekly!

Subtasks and their results - Examples

Literature

- Pdf documents
- List of keywords
- Brief description
- bib file
- Bibliography
- Quality check
- ...

Design

- Manual
- Functional description
- Manufacturing instructions
- Assembly instructions
- List of parts
- design drawings
- exploded-view drawing
- Test specification
- ...

Subtasks and their results - Examples

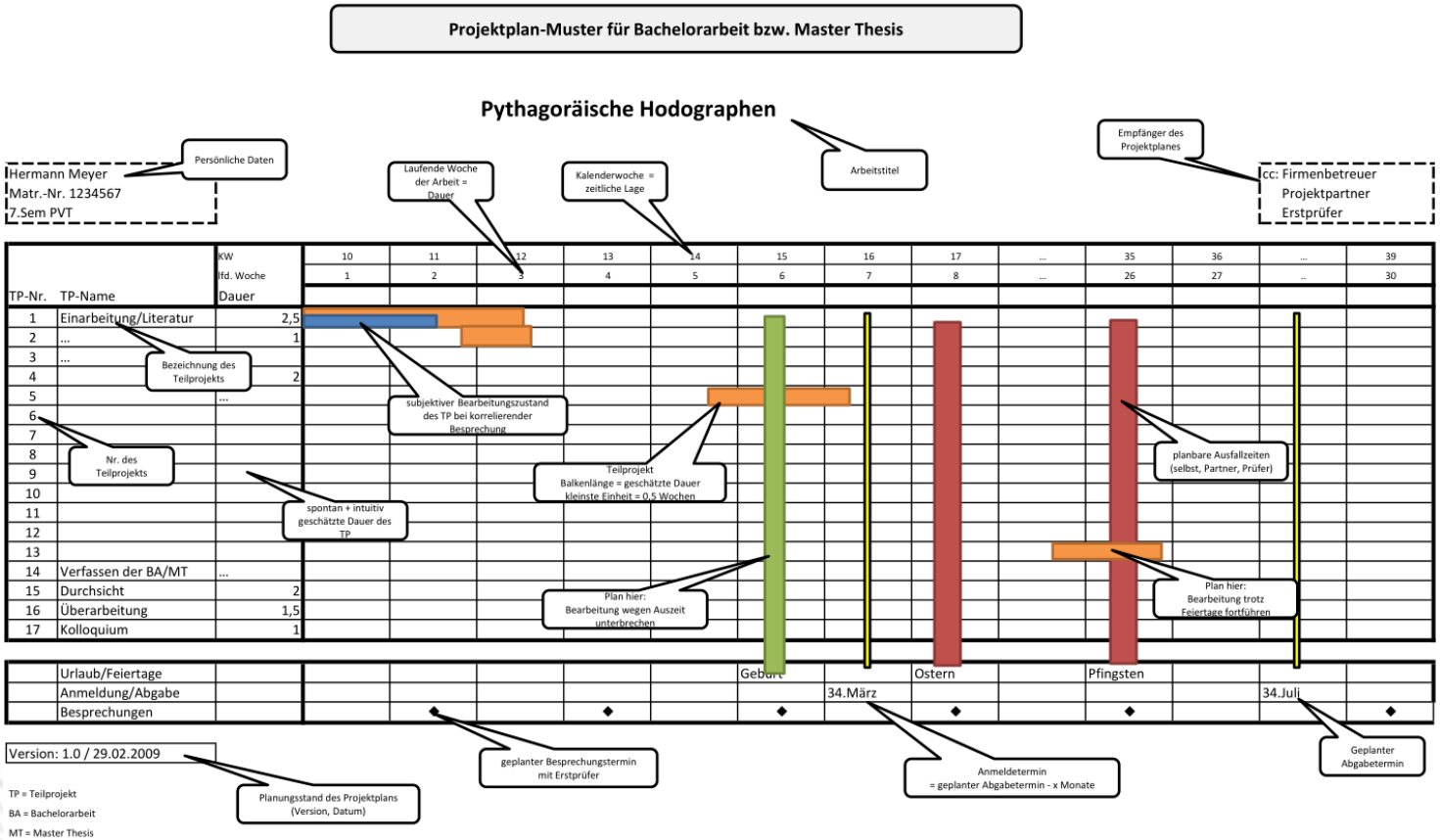
Software

- Manual
- Functional description
- Flow chart
- Test specification
- Code
- ...

Brief description

- LaTeX project
- Brief description
- Quality check
- Appointment for lamination
- Laminated description
- ...

Preparation of the project plan

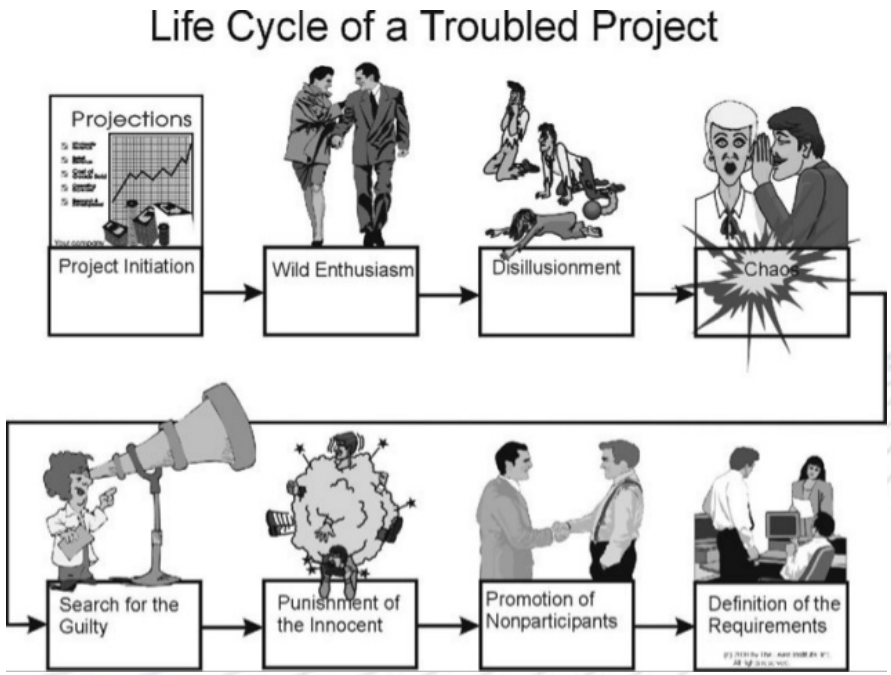


Reminder: 1 CP corresponds to an effort of 30h for an average student and an average grade.

Preparation of the project plan - Questions

The preparation of the schedule should take place in the first week.

⇒ Queries are then easily possible and expected.



Source funny-blogger

Preparation of documentation

Preparation of documentation

The documentation must mention who is the author and who edited!

Use the team for quality control!

Use of Images

Illustrations, tables, figures, etc. (“Images”) make the report more lively!

At the latest on every third page, such things should be built into the text.

Use of Images

All pictures should be numbered (consecutively or section by section) and provided with a concise signature. For each of these pictures, the number of the picture ("Picture 6 shows . . . " must be mentioned in the body text and a brief explanation of what it shows must be given; in addition, the important statements of the picture in particular must be verbally formulated.

Use of Images

If images have been taken from external sources, a reference to the source must be placed directly in the image or the respective caption. (In the case of post-processed or altered images, add “according to”: according to [4]).

Use of Images

Each image must be complete and self-explanatory; i.e. its data as well as its essential message must be recognisable even if the associated text is cut away!

Use of Images

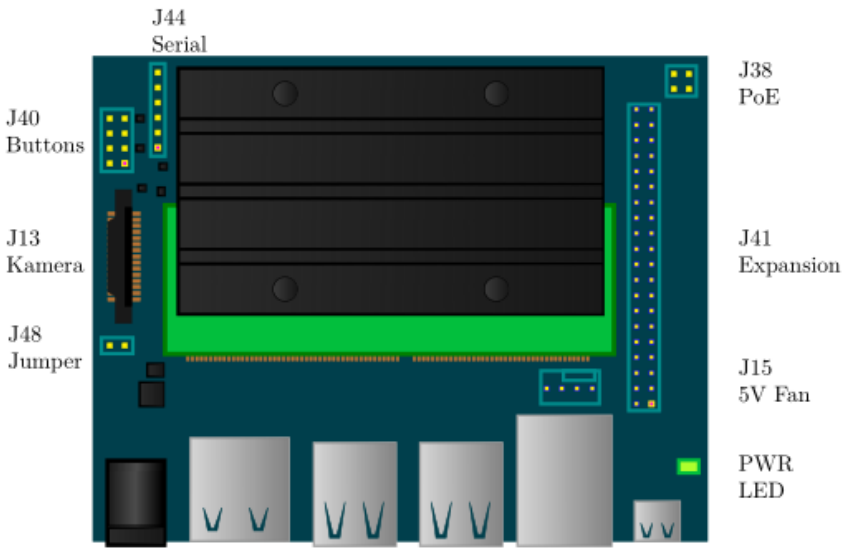
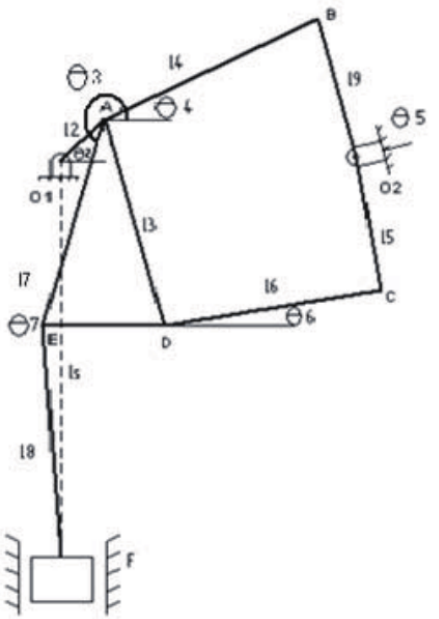


Abbildung 9.4.: Jetson Nano: Aufsicht

Source: author



Source: Balasubramanyam, C. et.al.: Currve fitting for coarse data using Artificial Neural Network [8]

Use of Images

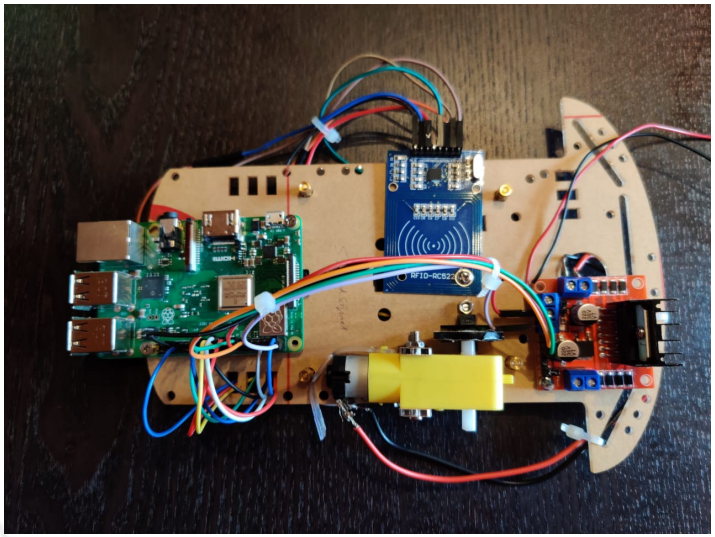
- Create your own images!
- Use tikz; see examples in the template!
- Use preliminary sketches!
- Create flow charts

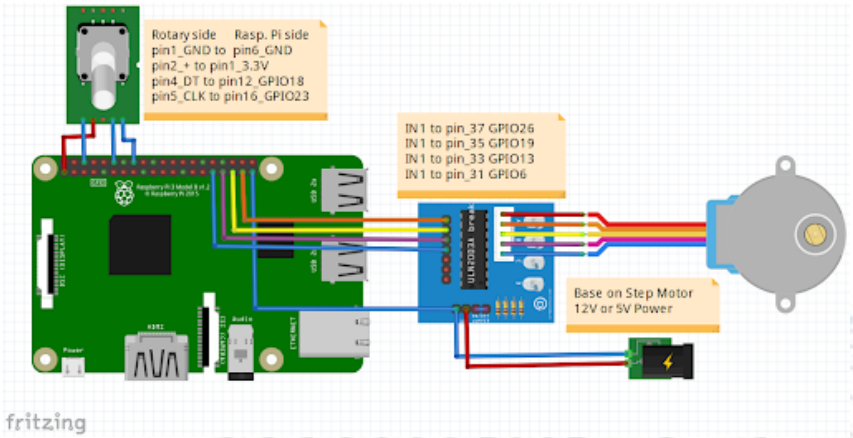
Hardware Description

One task is the description of the hardware.
This also includes the following points:

- Data sheets
- Mechanical dimensions
- Interfaces
- Correct designations
- Description of the mechanical structure
- Circuit diagram
- . . .

Circuit Diagram





List of Parts

- Unique name
- Identifier
- Quantity
- Supplier
- Price
- Informations
- Link
- Availability/Delivery time
- ...

In total, if possible, only one provider

35. Materialliste

Anzahl	Bezeichnung	Link
		
1	NVIDIA Jetson Nano Development Kit-B01	Eckstein-shop.de - SS10417
		
1	NVIDIA Jetson Nano Development Kit-B01	Eckstein-shop.de - WS16990
		
1	WaveShare AC8265 Wireless NIC for Jetson Nano WiFi / Bluetooth	Eckstein-shop.de - WS16578

Software Description

- First of all, create a user manual!
  - The user manual is also used later for testing.
  - It usually does not contain a description of the solution
- Create developer documentation

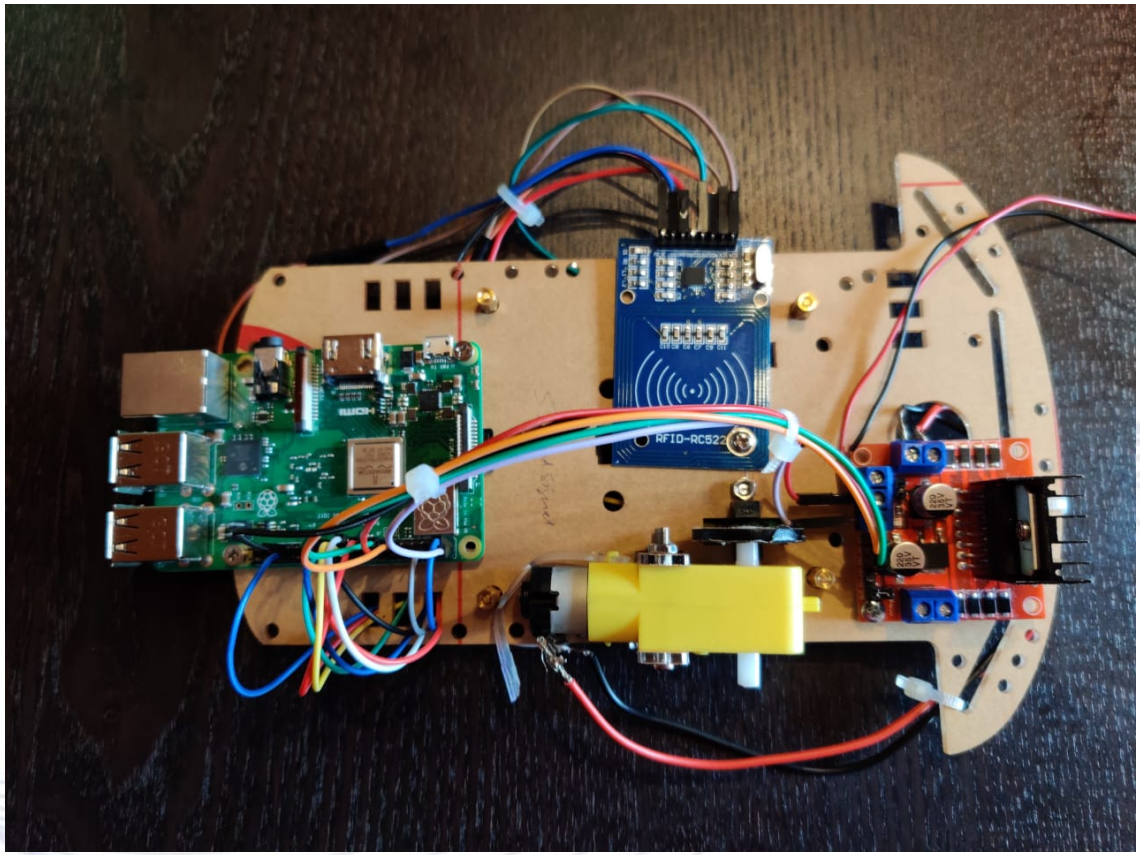
Formalities & General Hints

General Hints

- Use the team for quality control
- Ensure correct spelling

Hardware

„Never touch a running system.“



If I do it like this . . .

If I do it like this . . . → Meaning: I know better
If I do it like this . . . → Meaning: It is much more efficient
If I do it like this . . . → Meaning: I save time

Source: campushunter

Save your colleagues' and my time!

Formalities

- LaTeX
- Delivery with signature
- Delivery of all files
- Spelling
- Websites as pdf files
- README.md
- author.xlsx
- ...

Source: printerest

Formalities are minimum requirements!

Teamwork

Source: printerest

Teamwork

Source: printerest